AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. Cancelled.

2. Cancelled.

3. (Currently Amended)   A method for locating a pattern, comprising:
     providing a pattern image corresponding to the pattern to be located;
     extracting at least one pattern contour from the pattern image;
          wherein the step of extracting at least one pattern contour from a pattern image comprises:
          extracting at least one pattern contour from the pattern image;
          identifying undetected edge points; and
          modifying the at least one pattern contour to add any undetected edge points;
     generating vector information for each of said at least one pattern contours, relative to a reference point;
     creating at least one <u>reference</u> table for storing the vector information, each of said at least one reference tables corresponding to said at least one pattern contour;
     providing a scene image, which will be searched for the pattern;
     extracting at least one scene contour from the scene image;
     generating vector information for each of said at least one scene contours; and
     determining whether the pattern has been located within the scene image using the at least one reference tables and the vector information for the at least one scene

contours, and if so, identifying a location of the pattern within the scene image and an angle of rotation of the pattern within the scene image.

4. (Original) The method of claim 3, wherein the step of extracting at least one pattern contour from a pattern image further comprises:

removing aliased edge points from the at least one pattern contour;

spatially filtering the pattern contours; and

resampling the filtered pattern contours.

5. Cancelled.

6. (Currently Amended)   A method for locating a pattern, comprising:

providing a pattern image corresponding to the pattern to be located;

extracting at least one pattern contour from the pattern image;

generating vector information for each of said at least one pattern contours, relative to a reference point;

wherein the step of generating vector information for each of said at least one pattern contours, relative to the selected reference point, comprises:

choosing an index point corresponding to a point along said at least one pattern contour;

establishing a front point and a back point for said index point, the front point and the back point defining a stick vector;

establishing a R vector from the index point to the selected reference point;

determining a contour curvature value for the index point, the contour curvature value being a shortest distance between the index point and the stick vector;

determining a stick angle, the stick angle being an angle between the stick and the horizontal axis; and

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determining a SR angle for the index point, said SR angle being the angle between the stick vector and the R vector;

creating at least one <u>reference</u> table for storing the vector information, each of said at least one reference tables corresponding to said at least one pattern contour;

providing a scene image, which will be searched for the pattern;

extracting at least one scene contour from the scene image;

generating vector information for each of said at least one scene contours; and

determining whether the pattern has been located within the scene image using the at least one reference tables and the vector information for the at least one scene contours, and if so, identifying a location of the pattern within the scene image and an angle of rotation of the pattern within the scene image.

7. (Original) The method of claim 6, wherein a plurality of index points are chosen, and contour curvature values and SR angles are calculated, respectively, for each of said plurality of index points.

8. (Original) The method of claim 7, wherein the step of generating vector information for each of said at least one pattern contours, relative to the selected reference point, further comprises:

for each index point of said plurality of index points, determining a GR angle between a gradient of each of said index point and the respective R vectors for said index points.

9. (Original) The method of claim 6, wherein the step of creating at least one reference table containing said vector information comprises:

grouping the SR angles based on a contour curvature value;

grouping the stick angles based on the contour curvature value; and

grouping the R vector information based on the contour curvature value.

10. (Original)   The method of claim 9, wherein the step of creating at least one reference table containing said vector information further comprises:

grouping the GR angles based on the contour curvature value at the index point.

11. (Original)   The method of claim 6, wherein the SR angle is rotation invariant.

12. Cancelled.

13. (Currently amended) A method for locating a pattern, comprising:

providing a pattern image corresponding to the pattern to be located;

extracting at least one pattern contour from the pattern image;

generating vector information for each of said at least one pattern contours, relative to a reference point;

wherein the step of generating vector information for each of said at least one scene contours comprises:

choosing at least one scene index point corresponding to a point along said at least one scene contour;

determining a scene stick angle, the scene stick angle being an angle between a scene stick and the horizontal axis; and

determining a scene contour curvature and a scene SR angle for each of said at least one scene index points;

creating at least one <u>reference</u> table for storing the vector information, each of said at least one reference tables corresponding to said at least one pattern contour;

providing a scene image, which will be searched for the pattern;

extracting at least one scene contour from the scene image;

generating vector information for each of said at least one scene contours; and

determining whether the pattern has been located within the scene image using the at least one reference tables and the vector information for the at least one scene

contours, and if so, identifying a location of the pattern within the scene image and an angle of rotation of the pattern within the scene image.

14. (Original)   The method of claim 13, wherein the step of generating vector information for each of said at least one scene contours further comprises:
        determining a scene GR angle for each of said at least one scene index points.

15. Cancelled.

16. Cancelled.

17. Cancelled.

18. Cancelled.

19. (Currently amended)   A method for locating a pattern, comprising:
        providing a pattern image corresponding to the pattern to be located;
        extracting at least one pattern contour from the pattern image;
        generating vector information for each of said at least one pattern contours, relative to a reference point;
        creating at least one reference table for storing the vector information, each of said at least one reference tables corresponding to said at least one pattern contour;
        providing a scene image, which will be searched for the pattern;
        extracting at least one scene contour from the scene image;
        generating vector information for each of said at least one scene contours; and
        determining whether the pattern has been located within the scene image using the at least one reference tables and the vector information for the at least one scene contours, and if so, identifying a location of the pattern within the scene image and an angle of rotation of the pattern within the scene image;

wherein the step of determining whether the pattern has been located comprises:

calculating at least one potential reference point based on the extracted scene contour vector information and recording the instance of each of said at least one potential reference points;

calculating at least one potential angle of rotation based on the extracted scene contour vector information and recording the instance of each of said at least one potential angles of rotation;

wherein the step of calculating at least one potential angle of rotation based on the extracted scene contour vector information and recording the instance of each potential angle of rotation comprises:

determining an angle difference between a scene stick angle and a stick angle in the reference table; and

adding the potential angle of rotation to an angle accumulator;

identifying a location of the pattern within the scene image using the recorded potential reference points; and

determining an angle of rotation for the pattern within the scene image using the recorded potential angles of rotation.

20. (Currently amended) A method for locating a pattern, comprising:

providing a pattern image corresponding to the pattern to be located;

extracting at least one pattern contour from the pattern image;

generating vector information for each of said at least one pattern contours, relative to a reference point;

creating at least one reference table for storing the vector information, each of said at least one reference tables corresponding to said at least one pattern contour;

providing a scene image, which will be searched for the pattern;

extracting at least one scene contour from the scene image;

generating vector information for each of said at least one scene contours; and

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determining whether the pattern has been located within the scene image using the at least one reference tables and the vector information for the at least one scene contours, and if so, identifying a location of the pattern within the scene image and an angle of rotation of the pattern within the scene image;

wherein the step of determining whether the pattern has been located comprises:

calculating at least one potential reference point based on the extracted scene contour vector information and recording the instance of each of said at least one potential reference points;

calculating at least one potential angle of rotation based on the extracted scene contour vector information and recording the instance of each of said at least one potential angles of rotation;

identifying a location of the pattern within the scene image using the recorded potential reference points; and

determining an angle of rotation for the pattern within the scene image using the recorded potential angles of rotation

wherein the step of determining an angle of rotation for the pattern image comprises:

clustering the potential angles of rotation; and

identifying at least one potential angle of rotation where clustering has occurred beyond a predetermined threshold.

21. Cancelled.

22. (Previously Presented) A method for pattern recognition, comprising:

extracting pattern vector information from at least one pattern image, each pattern image having a pattern reference point;

creating a reference table containing the pattern vector information for each of the at least one pattern image;

extracting scene contour information from a scene image;

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calculating a potential reference point based on the scene contour information and the reference table;

matching the potential reference point with one of the at least one pattern reference points;

identifying a pattern image corresponding to the matching pattern reference point; and

identifying an angle of rotation for the scene image.

23. Cancelled.

24. (Previously Presented)   A method for pattern recognition, comprising:

extracting pattern vector information from at least one pattern image, wherein the pattern vector information includes a rotation invariant angle and each pattern image having a pattern reference point;

wherein the rotation invariant angle is defined by:

identifying at least one pattern index point on a contour of the pattern image;

identifying a front point and a back point for the pattern index point, the front point and back point defining a stick vector; and

identifying a R vector defined by the index point and the pattern reference point;

wherein the rotation invariable angle is defined by a SR angle between the stick vector and the R vector;

creating a reference table containing the pattern vector information for each of the at least one pattern image;

extracting scene contour information from a scene image;

calculating a potential reference point based on the scene contour information and the reference table;

matching the potential reference point with one of the at least one pattern reference points; and

identifying a pattern image corresponding to the matching pattern reference point.

25. (Previously Presented)   A method for pattern recognition, comprising:

extracting pattern vector information from at least one pattern image, each pattern image having a pattern reference point;

creating a reference table containing the pattern vector information for each of the at least one pattern image;

extracting scene contour information from a scene image;

calculating a potential reference point based on the scene contour information and the reference table;

wherein the step of calculating a potential reference point based on the scene contour information and the reference table comprises:

identifying at least one scene index point on a contour of the scene image;

calculating the potential reference point for each of the scene index points based on the reference table;

adding the potential reference point to a reference point accumulator; and

determining a likely potential reference point;

matching the potential reference point with one of the at least one pattern reference points; and

identifying a pattern image corresponding to the matching pattern reference point.

26. Cancelled.

27. Cancelled.

28. Cancelled.

29. Cancelled.

30. (New)   A method for measuring curvature of a contour in an image, the method comprising:

locating an index point corresponding to a point along the contour;

establishing a front point and a back point relative to the index point, the front point and the back point defining a stick vector;

establishing a distance (h) measured from the index point to a point perpendicular to the stick vector; and

correlating the distance (h) to an amount representative of the curvature of the contour.